

Why do Farmers Prefer Oil Palm? Lessons Learnt from Bungo District, Indonesia

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Abstract Indonesia has been the world's largest producer and exporter of palm oil since 2008. This paper discussed the livelihood impacts of oil palm development in Indonesia, based on lessons learnt from Bungo district, in the province of Jambi. The various community-company partnerships that structure the sector are reviewed and the difficulties raised by the joint ventures schemes are discussed. The merits and drawbacks of oil palm as a smallholder crop are then analysed, based on household socio-economic surveys conducted in 2007–2010. The main causes of conflicts between oil palm companies and communities are unclear land tenure, and a recurrent lack of leadership in smallholders' cooperatives. Under fair partnerships between smallholders and companies, oil palm could become a smallholder friendly crop. The land-use profitability analysis demonstrates the high returns that can be generated by oil palm independent smallholdings, making it highly competitive with rubber, and much more profitable than rice production.

Keywords Nucleus Estates and Smallholders scheme · Independent smallholders · Rubber agroforest · Livelihoods impact · Sumatra

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Introduction

From 1998 until late 2008, the international demand for palm oil regularly increased, leading to a rise in the Crude Palm Oil (CPO) price, partially due to speculation on the future demand for CPO both as vegetable oil and biofuel (FAO 2008). Oil palm has become a highly profitable source of income in all ecologically suitable areas. In Indonesia it also provides considerable income to the national and regional governments and, as a consequence, huge forested areas have been earmarked for oil palm development, especially in Sumatra, Kalimantan (Casson 2000) and more recently in the province of Papua (Sheil et al. 2009). Various oil palm development schemes can be found in Indonesia, from the large-scale estates of 50,000 ha owned by international companies, to 2 ha smallholdings owned by independent farmers. Despite the October 2008 price slump, world demand for edible oils is expected to further increase during the next 20 years (Levang et al. 2008; Sheil et al. 2009). Since the end of 2008 CPO prices have been recovering (Barrientos 2009) and oil palm plantations continue to expand (Sheil et al. 2009). However, the environmental consequences of oil palm development are often disastrous and numerous NGOs keep alerting the international community about both the negative environmental impact and the social unfairness of the crop's development in Indonesia (Wakker 2000; Marti 2008). Processing mills are a source of air and water pollution, plantations are a major cause of deforestation, the role of biofuel production in carbon storage is still unclear, and the impact of large estates on water regulation is still under debate (Sargeant 2001; WWF 2002; Lamade and Bouillet 2005; Simorangkir 2007; Germer and Sauerborn 2008; Danielsen et al. 2009).

On the island of Sumatra, oil palm is spreading over forests and displacing rubber plantations. *Hevea brasiliensis* was introduced in Jambi province at the beginning of the 20th century, progressively replacing swidden rice cultivation with agroforests (Joshi et al. 2002; Feintrenie and Levang 2009). These rubber agroforests are smallholder plantations combining rubber trees with useful species of timber and fruit trees, or handicraft material such as rattan and bamboo (Rasnovi et al. 2006; Beukema et al. 2007; De Foresta 2008; Lehébel-Péron et al. 2010). Since the 1950s, rubber agroforests have been challenged by monospecific rubber plantations, of both improved colonel seedlings and local varieties, which generate a higher return to land.

Oil palm was first introduced in Jambi province in the early 1980s by the transmigration program (Feintrenie and Levang 2009). This program aimed at moving volunteers from the over-populated islands of Java and Bali to the less populated islands of Sumatra, Kalimantan and Sulawesi (Levang 1997). These plantations usually followed a Nucleus Estates and Smallholders (NES) scheme in which a company holds a refinery and an estate surrounded by smallholdings. The wealth of Sumatran agriculture since the 1980s attracted more migrants from Java, a move that was further encouraged by district and provincial authorities eager to increase population density in their constituencies, especially since the passing of the regional autonomy laws in 1999 (Hugo 2000; Nurrochmat 2005; Feintrenie and Levang 2009).

A Godsend for some, a malediction for others, oil palm development gives rise to contrasting opinions. Many social conflicts between oil palm plantations and local communities or transmigrants, and between communities and district governments, have been recorded by NGOs. The reasons behind these conflicts are seldom linked to a rejection of the crop but rather to promises not kept or unfair benefit sharing (Suyanto et al. 2004; Gaiser 2009). Oil palm attracts farmers due to its high financial returns (Belcher et al. 2004; Sandker et al. 2007; Sheil et al. 2009). As Colchester et al. (2006, p. 11) observed: 'Done right, palm oil should generate wealth and employment for local communities. Done wrong, oil palm estates can lead to land alienation, loss of livelihoods, social conflicts, and exploitative labour relations and degraded ecosystems'.

This paper reports findings of a study of livelihood impacts of palm oil expansion in Bungo district of Jambi province. The socio-economic impacts of oil palm development for smallholders are examined, the various community-company partnerships which structure the sector in Indonesia are described, and the merits and drawbacks of oil palm as a smallholders' crop are discussed. Finally, some implications are drawn for land-use policy.

The Study Site

Bungo district is located in the province of Jambi, on the eastern piedmont of the Kerinci Seblat Range, in the centre of Sumatra Island (Fig. 1). Three main geomorphological units can be distinguished in the district. The piedmont of Kerinci Seblat Mountains, in the south-western part of the district, is of broken topography, on a granite bedrock, with altitudes ranging from 200 to 1,400 masl. Slopes are mainly covered with rubber agroforests, with remaining patches of secondary forest in the less accessible areas. Depressions behind river levees have been converted into rice paddies. Villages in this area are quite isolated, sometimes not yet connected to the asphalted road network. The transition area between the piedmont and the eastern plain has altitudes ranging between 100 and 450 masl, and moderately hilly topography with large valleys, on granite bedrock. In this area villages and agricultural land are easily accessible; monospecific plantations of rubber and oil palm are more frequent; riversides formerly converted into rice paddies have been left fallow since the late 1990s, when farmers preferentially turned to rubber cultivation. The third geomorphologic unit is the eastern alluvial plain, with an altitude under 200 masl. The bedrock material here is mainly tuff. This area is the most developed, with a dense road network and the capital city of the district, Muara Bungo. The first oil palm estate was introduced by the transmigration program in this area in 1983. Since 2000 the development of independent oil palm smallholdings has been reported in many parts of the district in the vicinity of estates (Bonnart 2008, Feintrenie and Levang 2009). The landscape is changing quickly in Bungo, with a high conversion rate of forests and agroforests into oil palm and rubber plantations. The dense forest cover has decreased from 42 to 30% of the district area between 1993 and 2005, and rubber agroforests from 15 to 11%; in contrast oil palm plantations have increased from 4

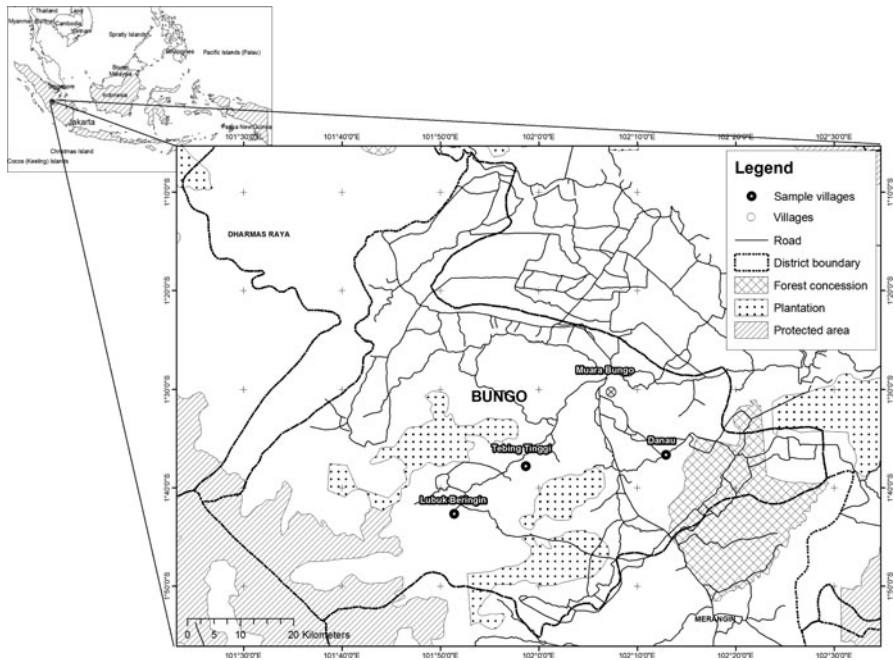


Fig. 1 Location of Bungo district in Indonesia and main land covers in 2009. *Source:* Dewi and Ekadinata (2010)

to 19% whereas rubber monoculture plantations are nearly constant from 26 to 27% (Ekadinata and Vincent 2010).

Research Method

The research method involved an analysis of the socio-economic conditions of oil palm development in Bungo, land-use profitability surveys three villages, and an assessment of the relative profitability of alternative land uses.

Analysis of the Socio-economic Conditions of Oil Palm Development in Bungo

Two to four semi-structured interviews were conducted in 2008–2010 with 17 civil servants about government's activities, land-use planning, oil palm development, forest conservation and agriculture, in six public service agencies (*dinas*): Forestry and Plantations (*Dinas Perkebunan-Kehutanan*), Agriculture, Fisheries and Animal Breeding (*Dinas Pertanian/Perikanan/Peternakan*), Transmigration (*Dinas Transmigrasi*), the head of district office (*Kantor Bupati*), Regional Planning (*Bappeda*) and the National Land Office (*Badan Pertanahan Nasional*).

Three oil palm companies were visited several times in 2007–2010, and the managers of refineries and plantations were interviewed on the conditions of the

installation of their company and its management, using semi-structured interviews. Using semi-structured personal interviews, 40 randomly selected workers of these companies were asked about their working and living conditions and why they chose to work for the company. Members and managers of four oil palm cooperatives included in a NES scheme were met to discuss the management and outcomes of the cooperatives, as well as eventual conflicts. Brokers and villagers in 30 villages, including eight transmigration sites, were interviewed about oil palm development, and the merits and drawbacks of this crop in comparison with rubber.

Three cases of conflicts within or between villages were discovered through literature review, interviews and observations. The 6 villages involved in the conflicts were visited in 2009 and semi-structured interviews were conducted with village leaders. The sample of 40 respondents included all the categories of stakeholders: civil servants and representatives of private companies, present and former heads of villages, heads of agriculture cooperatives and of farmers' groups, and a random selection of farmers involved in the conflicts, as well as a random selection of villagers not directly involved in the conflicts. Questions were asked about the causes and consequences of the conflict, the relationships between the various stakeholders, and the interventions of the public agents in the conflict.

Selection of the Sample of Villages Based on Previous Research Work

The selection of villages to conduct the land use profitability survey was based on a previous research work. A first exploration of the district in 2007 led to the elaboration of a typology of village agro-systems linked to the three main geomorphologic units of the landscape. A close link was identified between topography, accessibility and development stages. In Sumatra as in Kalimantan, development followed the waterways in a first stage. Cities first developed at the confluence of major rivers, set back from the inundated flood plains. Later the road network linked these cities to each other and progressively opened up the hinterland. The most upstream villages at the piedmont of the mountains are the last to be reached by the roads, the last to benefit from access to markets and services (education, health, electricity and phone). They are the last also to benefit from information and improved seedlings, from colonial rubber and oil palm development. Thus, the absence of oil palm development in a village is not caused by the rejection or reluctance of local farmers, but is a consequence of a lower accessibility of the village, a constraint that will be overcome over time, what was confirmed by a recent perception survey conducted in the district (Therville et al. 2010).

One output from this research is the classification of villages in Bungo into three categories, based on distance to forest, farming activities (intensification of plantations, from agroforests to oil palm estates), and economic development. These categories can be considered as the successive stages of a similar socio-economic development history. A village of the first category, in the piedmont area, with difficult access to plantations and to the village, inundated rice cropping behind river levees and rubber agroforests on slopes, may evolve into a village of the second category, with better accessibility thanks to road development, rubber monospecific plantations on the plots close to the road and eventually some oil palm

plantations in the most accessible plots; later on, this village can move to the third category, with an easy access to plots thanks to landscaping, oil palm and rubber monospecific plantations spread over the uplands, and few rice fields still cultivated.

Land Use Profitability Analysis

Socio-economic household surveys were conducted in 2007 and 2008, and an additional survey with focus on the impact of the financial crisis in January 2009. One village was selected in each category described above, to represent the district's diversity of situations. The most isolated village, Lubuk Beringin (sub-district Bathin III Ulu), is located at the piedmont of the Kerinci Seblat Mountain, and is still surrounded by protected forests. In this village, rice cultivation for self-subsistence has never been given up. There is limited social differentiation among villagers with rubber from agroforests as the main source of income. The second village, Tebing Tinggi (sub-district Muku-Muku Bathin VII), represents an intermediate situation. Social differentiation remains limited in the village, and the landscape is a mixture of rubber agroforests, durian agroforests, rubber smallholdings and inundated paddy fields, most of which were laid fallow for a decade until October 2008, people preferring the more profitable work in rubber monoculture plantations. The third village, Danau (sub-district Pelepat Ilir, which was divided into two village units at the end of 2008 (Danau and Padang Pelangh), is close to a transmigration area. Part of the village land was sold to an oil palm and rubber company in 1984. Some of the villagers participate in a NES deal with this company; they are grouped in a cooperative and possess individually at least 2 ha of oil palm plantation entrusted to the company. The village landscape is a combination of rubber and oil palm plantations. Few rice fields are still cultivated, and some were even converted into oil palm plantations. There is a high social differentiation among villagers, with a small number of very rich people.

The land-use profitability analysis consisted of the comparison of economic indicators and labour calendars of wet rice cultivation, rubber agroforestry, rubber monoculture plantation of improved clones, and oil palm independent smallholding. Every crop and plantation was precisely described during group interviews, in terms of work schedule, inputs and outputs (quantity and quality, seasonality, prices), tools used and their estimated usability life, and labour needs. For perennial crops these variables were defined for each productive period including year before planting, year of planting, immature period, period of maximum production, and period of declining production. A hundred farmers (males and females) randomly selected were interviewed in the three villages. Plots of each cropping system were visited with farmers to obtain more technical details and confirm information. The descriptions obtained during group discussions were compared to the descriptions from the individual interviews of 15 households for every crop, on the management and production of their plots. Interviews included discussions on the advantages and drawbacks of each crop.

Three economic indicators were then calculated: return to land, return to labour and maximum workable area for one person (in relation to labour needs). Return to land is the net added value generated by one hectare of land during 1 year, and

return to labour is the return to land divided by the number of working hours for one hectare during 1 year. The maximum workable area is calculated by dividing the number of hours available for one person by the highest monthly labour requirement for the crop. This value can be doubled to consider the maximum workable area of a household with two adults working on the plantation. Labour availability was estimated at 8 h a day, with 21 working days a month, that is to say 168 h/month. These indicators were calculated for every period of production of the smallholders' plantations using the software Olympe (Deheuvels and Penot 2007).

The survey of the socio-economic impacts of the 2008 crisis was conducted in January 2009 among a random sample of 60 households, 33 shopkeepers and small traders, 12 rubber middlemen, and other stakeholders of the local economy. Questions were asked about the prices of agricultural commodities, goods sold in market places and food, sale quantities of the same products (respectively to farmers, and shopkeepers and traders), strategies to cope with the crisis and expectations for the coming months. Monthly or bi-monthly field trips were conducted in 2009 through to February 2010, during which the impacts of the economic crisis were observed and assessed.

Results

The various oil palm company-community partnerships are presented, with a special focus on the joint ventures schemes existing in Bungo. Then the results of the survey of conflicts are analysed, followed by a discussion on the socio-economic conditions to the development of oil palm as a smallholder crop. Finally, the results of the land use profitability analysis are presented and discussed.

Oil Palm Company-community Joint Ventures in Bungo

The first types oil palm plantations in Indonesia followed a joint venture scheme between companies and smallholders called a Nucleus Estates and Smallholders (NES) scheme, a system tested in Malaysia in the 1970s and later introduced in Indonesia as *Perkebunan Inti Rakyat (PIR)* by the transmigration program. The first PIR in the late 1970s were based on rubber plantations, followed by oil palm schemes in the 1980s (Levang 1997). The PIR scheme was perfect for large oil palm companies to benefit both from huge areas of state forest conceded by the government and from a pool of low-cost labour composed by transmigrants (Casson 2000; McCarthy and Cramb 2009). Large plantation companies, *Perkebunan Besar Swasta (PBS)*, were also common in the rubber and oil palm sectors from the early 1980s to the mid-1990s. PBS did not always associate smallholders to a company; the company could buy the land from the State and hire workers. Land was sometimes expropriated from local populations with inadequate compensations (McCarthy and Cramb 2009), especially during the Suharto era. At the end of the 1980s, a new policy emerged, with the creation of the 'Primary Cooperative Credit for Members' scheme, *Koperasi Kredit Primer untuk Anggota (KKPA)*. KKPA involves a similar structure to the PIR scheme, including a partnership between a

company and smallholders. KKPA could be associated with a transmigration project, with local population joining the KKPA cooperative and transmigrants benefiting from a PIR scheme (McCarthy and Cramb 2009).

The usual KKPA schemes in Bungo rely on a contract signed between a company, smallholders grouped in cooperatives, and banks, under the supervision of the government. Farmers entrust their land to the company, which plants, manages and harvests the crops. The landowners are paid a percentage of the harvest revenue after deduction of plantation establishment and management costs. Local governments participate in the process through facilitation of discussions between the partners and land titling. Banks keep land titles as collateral, and the company is responsible for collecting the repayments from the farmers. Charges are made for these services, and they all add to the farmers' debts. Usually, the deal includes the handing over, from the village to the company, of a percentage of the total land to be developed. This land taken over by the company constitutes the *nucleus* of the plantation, in opposition to the *plasma* made up by all the smallholdings participating in the venture. The proportion of nucleus and plasma, in terms of land area, is commonly used to characterize the type of NES contract.

The first oil palm plantation in Bungo district was developed under the PIR-transmigration program, officially beginning in 1983, in the transmigration area of Kuamang Kuning (in the sub-district Pelepat), although land clearing and plantation establishment on this site only began in 1988. In 2006, the official statistics recorded 10,265 ha of estates, 11,480 ha of smallholdings under PIR-transmigration scheme, 9,012 ha of smallholdings under KKPA scheme, and 2,085 ha of independent smallholdings (BPS Statistik Kabupaten Bungo 2007). Four oil palm refineries share the processing of oil palm *fresh fruit bunches* (FFB) with a total capacity of 240 tonnes of crude palm oil (CPO) per hour.

The most common arrangement in Bungo district is the 70/30 contract, in which local people receive 'consolation fees' (*uang depraasah*) from the 70% of land they hand over to the company, and are entitled to 30% of the plantation. However, the planting costs of the 30% of land have to be paid by the smallholders. With the increasing price of land and growing land shortage, local villagers are more and more reluctant to participate in a NES contract. The field survey revealed that negotiations are becoming more difficult, and recently companies have proposed '60/40' arrangements, where only 60% of the plantation will go to the nucleus, and 40% will remain in the farmers' hands.

Another advantage for a farmer of participation in a NES scheme is the access to improved seedlings and technical advice. Oil palm is still a new crop in the area and most smallholders lack the basic knowledge for managing a plantation. Because starting capital is needed to cover planting and other input costs, farmers are reluctant to invest in a plantation which may not be as profitable as promised. The supervision of technicians from a company is a major incentive to planting. Smallholders can also entrust the management of their plots to the plasma cooperative and cash in a monthly rent. The cooperative will hire workers and manage the plantation following the recommendations of the company. The costs of employment are deducted from the amount of money paid to the landholder. Richer households with labour opportunities other than farming favour this kind of

arrangement. The management of the smallholdings can also be directly entrusted to the company, especially where the cooperative does not prove itself efficient or where managers do not handle conflicts between the members.

The beneficiaries of NES schemes are smallholders, both locals and transmigrants, but also company workers. The companies usually decide on a maximum land area that one household is allowed to buy in the plantation in order to increase the number of participants in the NES project. Working in a refinery is considered locally to be a 'good job'. It represents an opportunity to move out of farming, thus to improve one's social status, if not livelihood. Company workers are provided accommodation and facilities including a school bus and a medical centre. But local people generally prefer commuting between the village and the refinery. Far from the village they miss their social and family relations, the evening chats and activities, and the daily gossip. Another reason for preferring living in the village is the high level of pollution around the mills. Mills produce large amounts of waste, both liquid and solid, and also noxious odours and smoke (McCarthy and Zen 2010).

Causes of Conflicts and Drawbacks to Oil Palm Development in Bungo

The planting and management costs of NES contracts are said to create high levels of debt and are regularly blamed for being unfair to smallholders. According to some NGOs the amount of debt is sometimes so high that smallholders are unable to meet repayments during the production period (Marti 2008). In fact, the difficulties to repay the debt vary greatly with the conditions of the deal. The main variables in this deal are: the rate of interest applied by the bank, the value of the initial debt estimated by the company, the price of FFB paid to smallholders, and the percentage of monthly net added value (NAV) that smallholders agree to allocate to the reimbursement of their debt.

The leadership of plasma cooperatives is also a major factor of success of a NES scheme. Where leaders are recognized by the members for their honesty and ability, and where they have a good communication with the management of the company, the partnership may be a real win-win situation. This was the case in one of the main cooperatives of Bungo, which also benefited from the high prices of palm oil at the end of the 1990 s: the conditions offered in 1998 for a smallholding of 2 ha included about 15 M Rp of loan (1,700 US\$) at a 14% interest rate. Repayments began the fifth year after planting at 30% of the monthly NAV. With such a contract and the high price of FFB (until July 2008 the prices were at more than 1,500 Rp/kg at the mill gate), smallholders took less than 6 years to reimburse their credit. Some plasma-smallholders even chose to reimburse their credit faster by committing 60% of NAV to debt repayment. Thus, 90% of the members of the cooperative had repaid their debt in less than 3 years (i.e. 8 years after planting) (Fig. 2). The other members had asked for delays for personal reasons. The monthly net income between 8 and 25 years after planting, free from any debt and with this high price of FFB (1,500 Rp/kg, or 111€/t), is about 440 €/month for a 2 ha plot. In other cooperatives, conflicts were observed between members and leaders, ending in a replacement of the leaders—elected by the members—every year. In this situation,

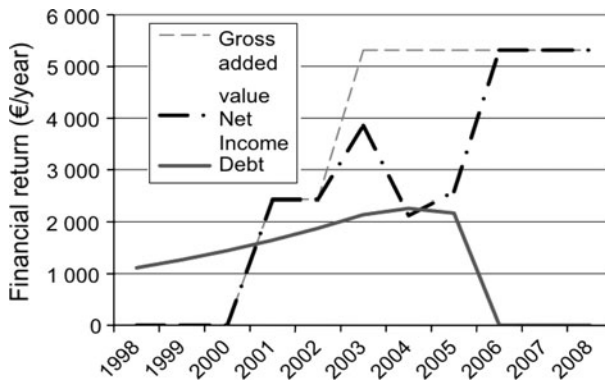


Fig. 2 Financial results of an oil palm smallholding in the NES scheme

the company took charge of most of the work in the smallholdings (harvest, fertilization, sanitary operations), charging the additional incurred costs to the smallholders.

Although oil palm companies have recently implemented affirmative action policies for recruiting local people, hopes of employment have attracted numerous spontaneous migrants from Java to Bungo district. These add to the more than 1,300 transmigrant households that arrived between 2002 and 2006 following the regional public transmigration program (BPS Statistik Kabupaten Bungo 2007). Transmigration, either organized by the government or spontaneous, has often been pointed as a source of social conflict in Indonesia. However, there is no strong hostility between Javanese and Melayu ethnic groups; their cultural behaviour is similar, and both ethnic groups share the Muslim religion. Javanese migrants are generally welcome as a low-cost labour force by local farmers, and mixed weddings are common. Nevertheless, successful migrants who become richer than local people may create envy.

At least three cases of social conflict linked to oil palm transmigration programs were reported in Bungo. The oldest case is a transmigration site in Tanah Tumbuh sub-district between 1994 and 1998 when the local community clashed with an oil palm company (Suyanto 2007). People from four villages united to claim rights on the concession given by the Ministry of Forestry to the company. They were dissatisfied with the compensation offered by the company, and the conflict became more serious by mid-1998, with the political movement of reforms (*reformasi*) after the fall of President Suharto. It ended in local farmers burning the company's base camp and oil palm nursery, and as a consequence the company ceased all activities there (Suyanto 2007). Unclear land tenure and a lack of consultation with the local communities were the sources of this conflict. People were asked to follow a program planned by ministries in Jakarta, far from their village and their concerns. Encouraged by the *reformasi* dynamics, they were not afraid to protest for their rights over land. Since 1999, the implementation of regional autonomy put an end to such transmigration projects planned by the centre. But some provinces and districts have taken up the concept and organized transmigration projects in their

constituencies. With district heads directly elected by local people, cases like Tanah Tumbuh are unlikely to occur again. Local community consultation is now an absolute prerequisite for any transmigration project.

Another case of conflict related to an oil palm transmigration project took place in Pelepat sub-district in 2001–2002 (Chong 2008), due to unclear boundaries between villages and a non-transparent process of land allocation for the transmigration site. Here the problem did not directly involve the company, and was mainly a conflict between two villages. The lack of an official and reliable cadastre often allows for unverifiable land claims by individuals as well as by groups, and hence land tenure uncertainty.

Yet another case of conflict reported commenced in 2004 with the launch of a new oil palm transmigration project in Sungai Telang village, in Bathin Tiga Ulu sub-district. Villagers agreed to take part in the project and conceded about 1,000 ha of land for its implementation. To compensate for such a large amount of land being given the transmigration project was to incorporate equal numbers of local and transmigrant households (Adnan and Yentirizal 2007). Although the transmigrants arrived from Jakarta in 2004 and 2005, the oil palm company never came. Until this day, the locals as well as the migrants are still hoping for a company to come. In 2008, migrants started planting oil palm on their own initiative, but land shortage has created tensions between natives and migrants. Considering that promises were not kept, the local people are now fighting to get their land back from the transmigrants. Some violent actions to expel the migrants were reported (e.g. burning of plots). Bad governance in the organization of the project generated this conflict, when the district government settled Javanese migrants on local communities' land without securing oil palm development.

These cases reflect poor governance about the management of oil palm development, but they also illustrate the willingness of the district government to support oil palm expansion. In all cases, local people as well as migrants felt deceived and mistreated, and sometimes vented their anger at innocent third parties. Nevertheless, no one refused oil palm development; on the contrary, people asked for more participation in oil palm development. A perception survey of opinion about land uses, landscape and forest conservation, clearly revealed that all villages have been willing to accommodate an oil palm company on their premises (Therville et al. 2010). People see their future in oil palm and rubber and no one longs for maintaining more traditional ways of life. Even during the financial crisis, farmers still believe in rubber and FFB production as their only hope for a better future.

Oil palm development can be tantamount to land grabbing, uprooting of local communities, unfair deals extorted from helpless farmers, and poorly paid jobs (Marti 2008). This might be true in some locations in Indonesia, but it clearly does not fit to the Bungo district, or at least such observations would only reflect their author's perception of a regional process of economic development. Local peoples' perceptions of oil palm development are much more positive. Since 1999 and the end of the centralized transmigration program, there have been no cases of communities forced to sell their land to a company in Bungo. Whenever people sold their land, they did it on a voluntary basis, and as participants in a NES scheme. In

locations concerned by such schemes, smallholders could refuse to participate in the program. Those who did, nowadays often express their regrets and hope for a second round to come soon. Concerning unfairness issues of NES, the presence of several companies in the district creates a competition beneficial to farmers, enabling them to negotiate NES contracts on more favourable terms. Villagers meet regularly in order to define a village strategy and the conditions under which they would agree to welcome a company on their territory. Unfair deals have been reported, but only in very remote villages where farmers did not want to wait any longer for a better offer from another company.

Conditions to Oil Palm Development for Independent Smallholders

Although oil palm plantations are quickly spreading in Bungo district, rubber agroforests and rubber monospecific plantations still dominate the landscape. Agroforests present low costs of establishment and maintenance, and low labour requirements that are important advantages compared to monospecific plantations. Besides, oil palm cultivation presents some drawbacks. A processing mill in close proximity is essential to the development of smallholders' plantations because FFBs must be processed less than 48 h after harvest. Smallholders are afraid they lack the technical knowledge, and dislike the high levels of inputs required by the crop, especially fertilization (Therville et al. 2010). High quality seedlings are out of reach of smallholders, because companies book up available seed supplies years in advance. However, rubber may present the same drawbacks if cultivated in a conventional way. The supply in high quality rubber seedlings is not regular in Jambi, and smallholders often consider fertilizers too expensive. As a consequence, farmers have adopted their own practices, with the use of local seedlings and less fertilization. The returns from these practices are lower than those of conventional high quality cloned rubber plantations, but they are still positive. A group of medium land owners holdings of 10–50 ha has emerged in the district, thanks to the economic development of the rubber sector, which benefited from high prices between 1998 and 2008. These landowners have already engaged in oil palm expansion, both in NES schemes and in independent plantations. Independent smallholdings of 2–10 ha of oil palm are becoming frequent in the district, even though up to now the holders are mainly wealthy farmers or non-farmers.

An important parameter in the comparison of plantation types is the length of the unproductive plantation period, a difficult period for smallholders where cash and labour input are crucial to protect the seedlings from pests and competition from weeds, without any direct income. Oil palms if adequately fertilized start producing in the fourth year after planting. Rubber trees can be tapped in their seventh year when they are cultivated under highly favourable conditions with no weed competition, no shade and fertilization. Improved rubber clones can be tapped from the sixth year. But in Bungo most smallholders only plant local rubber seedlings, which cannot be tapped before 10 or 11 years. When planted in agroforests, local seedlings need even more time to grow and take 15 years to reach a trappable size. Notably, during the immature period, plots are left to spontaneous vegetation regrowth, and farmers are able to pursue other sources of income, e.g. work in

already mature plantations or off-farm activities. They may also intercrop immature plantations. The shorter unproductive period of oil palm is particularly important in areas where land shortage is already felt.

Farmers with smaller holdings favour crops that provide a quick return on investment. However, they are loath to give up rubber for oil palm. Rather, they want to keep plots of rubber as well as plots of oil palm. Rubber and oil palm present a seasonal production pattern. Rubber trees cannot be tapped on rainy days because the latex would leak out of the cups. Therefore, the production of natural rubber is always higher during the dry season, while oil palm produces more during the rainy season, when palms receive more water. As a consequence, the two commodities are complementary in terms of labour use.

Land Use Profitability Analysis

Rice cultivation was a major land use in Bungo. Traditionally, rice was cultivated for home-consumption and rarely sold. Rice was first cultivated in swiddens, in rotation with long bush fallows, a traditional system called *ladang* in Indonesia. This system almost disappeared in the district with the development of rubber agroforests (Feintrenie and Levang 2009). In agroforests, upland rice can be intercropped during the first 2 years of establishment of rubber, and upland rice without rubber is only cultivated in the most remote areas of the district. Nowadays, farmers prefer cultivating lowland rice in the depressions located behind the riverbanks, close to settlements, which are better protected against wild boars and birds. Nevertheless, wet rice cultivation is also disregarded by farmers due to the high profitability of alternative land uses. The comparison of returns to land of perennial crops and wet rice at July 2008 prices demonstrates the higher profitability of plantation crops. Indeed, the average returns to land on a full cycle of a plantation were: 2,100 €/ha for oil palm, 2,600 €/ha for a clonal rubber plantation and 1,300 €/ha for a rubber agroforest (Fig. 3), and only 200 €/ha for a paddy field. The

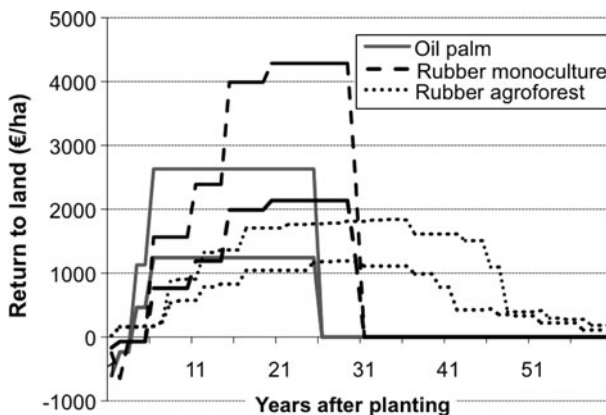


Fig. 3 Comparison of returns to land in conditions of high and low prices, according to the age of the plantations

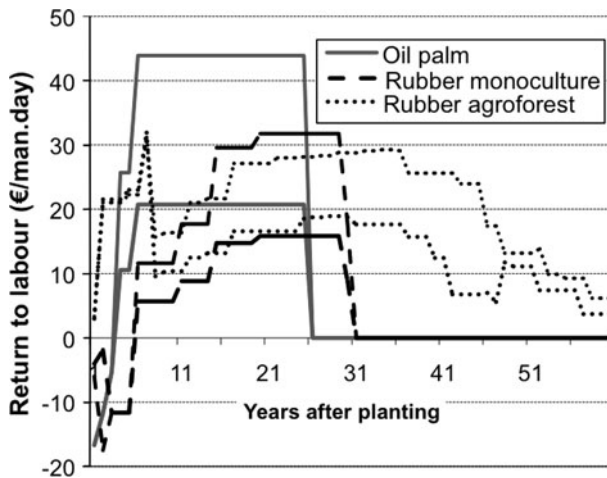


Fig. 4 Comparison of returns to labour in conditions of high and low prices, according to the age of the plantations

comparison of returns to labour is even more striking: 36 €/man-day for oil palm, 17 €/man-day for clonal rubber, 21 €/man-day for rubber agroforest (Fig. 4), and only 1.7 €/man-day for wet rice. With such a difference it is easily understandable that most wet rice fields have been left fallow since the end of the 1990s, when the local price of natural rubber peaked after the large depreciation of the national currency. The only villages where wet rice was still cultivated in 2008 were the most isolated ones. In all other villages, only the poorest families maintained paddy fields. In some cases, paddy fields have even been converted into rubber or oil palm plantations. Once rice supply is secured at a stable price on the market, farmers no longer feel the need to secure their rice self-sufficiency on the farm. When better opportunities are available, farmers usually opt for the most profitable activity they can manage, be it cash crops or off-farm activities. This has been happening in Bungo for decades, with farmers first shifting from upland rice cultivation to rubber agroforests, and then from rubber agroforests to monospecific plantations of rubber and oil palm.

One consequence of the financial crisis observed in Bungo in January 2009 is the resumption of wet rice cropping, as a way to secure food supply, in the villages where paddy fields have been left fallow since 1998 and were not converted into rubber or oil palm. But even with low prices for natural rubber and oil palm FFBs, and a rather high price for rice in the district, the profitability of rice cultivation remains far lower than that of perennial crops. In conditions of low CPO and rubber prices, the average returns to land are: 990 €/ha for oil palm, 1,300 €/ha for clonal rubber and 690 €/ha for rubber agroforest; average returns to labour are 16 €/man-day for oil palm, 9 €/man-day for clonal rubber and 14 €/man-day for rubber agroforest, still 5–10 times as high as for rice.

The comparison of the economic performance of rubber agroforests and clonal rubber or oil palm independent smallholdings in a context of high prices of

commodities (July 2008), clearly reveals the higher return to land of monospecific plantations (Fig. 3). But rubber agroforests have a higher return to labour than colonial rubber, and oil palm has an even higher return to labour (Fig. 4). These performances are mainly due to the low labour requirements for harvesting during the productive stage. Natural rubber is traditionally tapped every morning, with 2 days off per week, i.e. five working days per week (with exception of rainy days and 1 month of dry season during which rubber tree are not tapped). Even though tapping only takes half days, it is still more labour consuming than harvesting oil palm FFBs, which only require two harvesting days every fortnight.

In a context where land is still available and labour scarce, farmers logically favour the return to the scarcest factor. Thus, they will tend to favour crops with the highest possible return to labour rather than a high return to land. This is the case in Bungo, which partially explains the present trend of rubber agroforest conversion to oil palm plantations. Also related to labour needs, the maximum workable area is an informative indicator of people's preference for one or other crop. During the mature period of plantations, the maximum area one smallholder can manage is 1.34 ha of rubber monospecific plantation, or 2.94 ha of rubber agroforest, or 3 ha of oil palm plantation. These areas can be doubled if considering a household with two adults working on the plantation. Once again oil palm comes out as the most attractive cash crop for smallholders.

In Bungo, the global financial crisis of 2008 translated into a slump in rubber and palm oil prices in October 2008, just after the Muslim festivities of Idul Fitri. In less than 1 month, prices of rubber slab (with dry rubber content 50%) at local auction sale decreased from 15,000 Rp/kg to 6,000 Rp/kg. Palm oil price started decreasing in July 2008. The price of oil palm fresh fruit bunches decreased from 1,800 Rp/kg in July 2008 to 1,000 Rp/kg in October, and even 600 Rp/kg in November (Fig. 5). But since December 2008, prices have been increasing, and the natural rubber price

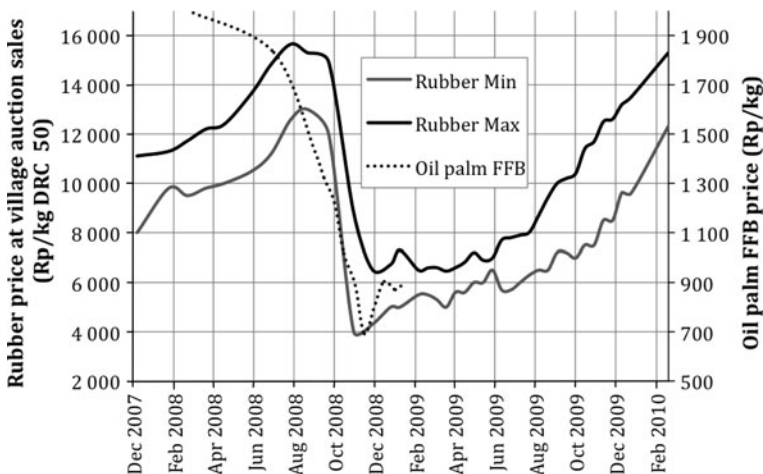


Fig. 5 Natural rubber price at local auction sale markets and oil palm fresh fruit bunches price at mill gate in Bungo district, during the 2008 financial crisis

is back to the highest level of 2008. This plummeting of commodity prices greatly reduced economic performances of smallholder plantations for several months. Returns to land and labour for rubber and oil palm plantations have decreased by more than 50%. Rubber agroforests, benefiting from secondary products including fruit and rattan, experienced a smaller decrease, of about 40%. However, this crisis was considered as only short term by the farmers and has not reduced their interest in growing rubber or oil palm.

Conclusion

Before the arrival of oil palm, livelihoods in Bungo district depended mainly on rice cultivation for self-consumption, and rubber cultivation for cash income. Three main categories of factors may explain farmers' preference for oil palm: the direct profitability of smallholdings is a main driver of farmers' choices; the technical characteristics of the crop including less labour; the high return on investment; and the partnerships with big companies and banks, that bring a number of advantages, but also constraints. Oil palm development has brought new job and income opportunities to local people, and the possibility to vary their cash crops. Independent oil palm smallholdings are highly profitable, but farmers lack the technical knowledge and some important inputs including high quality seedlings.

Oil palm development in Bungo district has improved the livelihoods of both local people and migrants. Even though some conflicts related to oil palm plantations have been reported, local people are willing to convert large portions of their land into oil palm plantations. However, they request a fairer development regime, where they would obtain a greater share of the revenue without handing over too much land to the partner oil palm company. Rather than giving up their land to the companies they would prefer producing fresh fruit bunches on their own individual plots. Companies could concentrate their activities on FFB processing and marketing, and technical supervision of smallholders' plots. Such a scheme has proved its efficiency with other agricultural commodities including natural rubber and coffee. No agronomic or economic specificity of oil palm justifies the necessity to resort to an estate dominated development regime.

Deforestation is also exacerbated by local community behaviour; rather than planting oil palm in lieu of their former plantations, farmers prefer extending their cultivated land at the expense of forests. They sell the most remote parts of their holdings to companies and keep the most accessible plots for individual plantations. They do not appear concerned by deforestation or loss of biodiversity, as long as deforestation is synonymous with economic development and livelihood improvement. The promotion of a smallholder development regime should also include environmental regulations and means of enforcement of these regulations, as well as technical training and supervision. Indeed, if smallholders usually apply less chemicals and fertilizer than estates, they may also lack the knowledge about environmentally friendly agricultural practices. For example, plantations of oil palms on steep slopes without adequate terracing face a high risk of erosion and landslides; smallholders accustomed to growing rubber, which does not need such

preliminary land preparation, may not be aware of this issue. The ban of planting in locations of high biodiversity value, natural forests and peat land also needs to be enforced among both companies and smallholders.

High prices of natural rubber and CPO during the last two decades induced rapid economic development in the district, with rapid improvement of livelihoods through increased income. Farmers were able to send their children to high school and university, and an increasing number of natives came back to their villages as public servants, most often primary school teachers. This period marked a major step in the agrarian transition of the region, with an increase of the proportion of non-farmers among the population (BPS Statistik Kabupaten Bungo 2007). Moving out of farming is perceived by local farmers as an improvement of their social status, and is associated with modern life and urban comfort. This evolution, combined with increasing returns to land, represents an opportunity to release pressure on land and forests. With fewer farmers in need of land for their livelihood, less forest needs to be converted into agricultural land. The agrarian transition is going on, as the process of evolution of an agricultural and rural society into a more urban and industrialized one.

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References

- Adnan H, Yentirizal N (2007) Blessing or misfortune? Locals, transmigrates and collective action. CIFOR, Bogor
- Barrientos M (2009) Index mundi. <http://www.indexmundi.com>. Accessed 30 April 2009
- Belcher B, Rujehani BM, Imang N, Achdiawan R (2004) Rattan, rubber, or oil palm: cultural and financial considerations for farmers in Kalimantan. *Econ Bot* 58:S77–S87
- Beukema H, Danielsen F, Vincent G, Hardiwinoto S, Van Andel J (2007) Plant and bird diversity in rubber agroforests in the lowlands of Sumatra, Indonesia. *Agrofor Syst* 70(3):217–242
- Bonnart X (2008) Agrarian diagnosis in Bungo district, Jambi province, Indonesia. Master of tropical agronomy thesis. IRC-SupAgro, Montpellier, France
- BPS Statistik Kabupaten Bungo (2007) Bungo dalam angka—Bungo in figures—2006. BPS-Statistik Kabupaten Bungo, Muara Bungo
- Casson A (2000) The hesitant boom: Indonesia's oil palm sub-sector in an era of economic crisis and political change. CIFOR Occasional paper, Bogor
- Chong WK (2008) Oil palm development and land management in Bungo district. Master in agriculture science thesis. IRC-SupAgro, Montpellier, France
- Colchester M, Jivan N, Andiko MS, Sirait M, Firdaus AY, Surambo A, Pane H (2006) Promised Land. Palm oil and land acquisition in Indonesia: implications for local communities and indigenous peoples. Forest Peoples Programme/Perkumpulan Sawit Watch, Jakarta
- Danielsen F, Beukema H, Burgess ND, Parish F, Brühl CA, Donald PF, Murdiyarso D, Phalan B, Reijnders L, Struwig M, Fitzherbert AB (2009) Biofuel plantations on forested lands: double jeopardy for biodiversity and climate. *Cons Biol* 2(2):348–358
- De Foresta H (2008) Forêts et foresteries dans les régions tropicales. In: Hallé F, Lieutaghi P (eds) *Aux origines des plantes*. Fayard, Paris
- Deheuvels O, Penot E (eds) (2007) *Modélisation économique des exploitations agricoles. Modélisation, simulation et aide à la décision avec le logiciel Olympe*. L'Harmattan, Paris

- Dewi S, Ekadinata A (2010) Landscape dynamics over time and space from ecological perspective. ICRAF Southeast Asia working paper (in press)
- Ekadinata A, Vincent G (2010) Rubber agroforests in a changing landscape: Analysis of land use/cover trajectories in Bungo district, Indonesia. Forests, trees and live (in press)
- FAO (2008) Agriculture statistics. FAO statistics division. <http://faostat.fao.org>. Accessed 27 November 2008
- Feintrenie L, Levang P (2009) Sumatra's rubber agroforests: advent, rise and fall of a sustainable cropping system. *Small Scale For* 8(3):323–335
- Gaiser N (2009) Oil palm in Kalimantan: the meaning of oil palm expansion on local farmers' lives—two case studies of villages in Sanggau district, West Kalimantan. Bachelor of ethnology thesis. Albert-Ludwigs university, Freiburg, Germany
- Germer J, Sauerborn J (2008) Estimation of the impact of oil palm plantation establishment on greenhouse gas balance. *Env Dev and Sust* 10(6):697–716
- Hugo G (2000) The impact of the crisis on internal population movement in Indonesia. *Bull Indones Econ Stud* 36:115–138
- Joshi L, Wibawa G, Vincent G, Boutin D, Akiefnawati R, Gerhard MG, Van Noordwijk M, Williams S (2002) Jungle rubber: a traditional agroforestry system under pressure. ICRAF. SEA regional office, Bogor
- Lamade E, Bouillet JP (2005) Carbon storage and global change: the role of oil palm. *Oléagineux corps gras lipides* 12(2):154–160
- Lehébel-Péron A, Feintrenie L, Levang P (2010) Rubber agroforests profitability, the importance of secondary products. Forests, trees and live (in press)
- Levang P (1997) La terre d'en face. La transmigration en Indonésie. ORSTO, Montpellier, France
- Levang P, Sheil D, Kanninen M (2008) Le palmier à huile, Dr Jekyll pour l'énergie, Mr Hyde pour la biodiversité. Liaison énergie-francophonie/UICN, Special Congrès mondial de la nature 2008: 26–31
- Marti S (2008) Losing ground—the human rights impacts of oil palm plantation expansion in Indonesia. Friends of the earth, London, UK; life mosaic, Edinburgh. UK; and Sawit Watch, Bogor
- McCarthy J, Cramb RA (2009) Policy narratives, landholder engagement, and oil palm expansion on the Malaysian and Indonesian frontiers. *Geogr Journal* 175(2):112–123
- McCarthy J, Zen Z (2010) Regulating the oil palm boom: assessing the effectiveness of environmental governance approaches to agro-industrial pollution in Indonesia. *Law and policy* 3(1):153–179
- Nurrochmat DR (2005) The impacts of regional autonomy on political dynamics, socio-economics and forest degradation. Case of Jambi, Indonesia. PhD thesis, Goettingen University, Germany
- Rasnovi S, Vincent G, Van Noordwijk M (2006) Forest tree regeneration in rubber agroforests in Jambi. In: Noordwijk MV, O'Connor T (eds) ICRAF working paper. Bogor, Indonesia
- Sandker M, Suwarno A, Campbell BM (2007) Will forests remain in the face of oil palm expansion? Simulating change in Malinau, Indonesia. *Ecol and soc* 12: 37. Available via <http://www.ecologyandsociety.org/articles/2292.html>
- Sargeant HJ (2001) Vegetation fires in Sumatra, Indonesia. Oil palm agriculture in the wetlands of Sumatra: destruction or development? Dinas kehutanan, Jakarta
- Sheil D, Casson A, Meijaard E, Van Noordwijk M, Gaskell J, Sunderland-Groves J, Wertz K, Kanninen M (2009) The impacts and opportunities of oil palm in Southeast Asia. What do we know and what do we need to know? CIFOR, Bogor, Indonesia
- Simorangkir D (2007) Fire use: Is it really the cheaper land preparation method for large-scale plantations? *Mitigation Adapt Strat Glob Change* 12(1):147–164
- Suyanto S (2007) Underlying cause of fire: different form of land tenure conflicts in Sumatra. *Mitigation Adapt Strat Glob Change* 12(1):67–74
- Suyanto S, Applegate G, Permana RP, Khususiyah N, Kurniawan I (2004) The role of fire in changing land use and livelihoods in Riau-Sumatra. *Ecol and Soc* 9: 15. Available via <http://www.ecologyandsociety.org/articles/632.html>
- Therville C, Feintrenie L, Levang P (2010) What do farmers think about forest conversion to plantations? Lessons learnt from Bungo district (Jambi, Indonesia). Forests, trees and live (in press)
- Wakker E (2000) Funding forest destruction—the involvement of Dutch banks in the financing of oil palm plantations in Indonesia. AID environment, contrast advices, telapak. Greenpeace Netherlands, Amsterdam
- WWF (2002) Forest landscape restoration: working examples from five ecoregions. Doveton press, Bristol